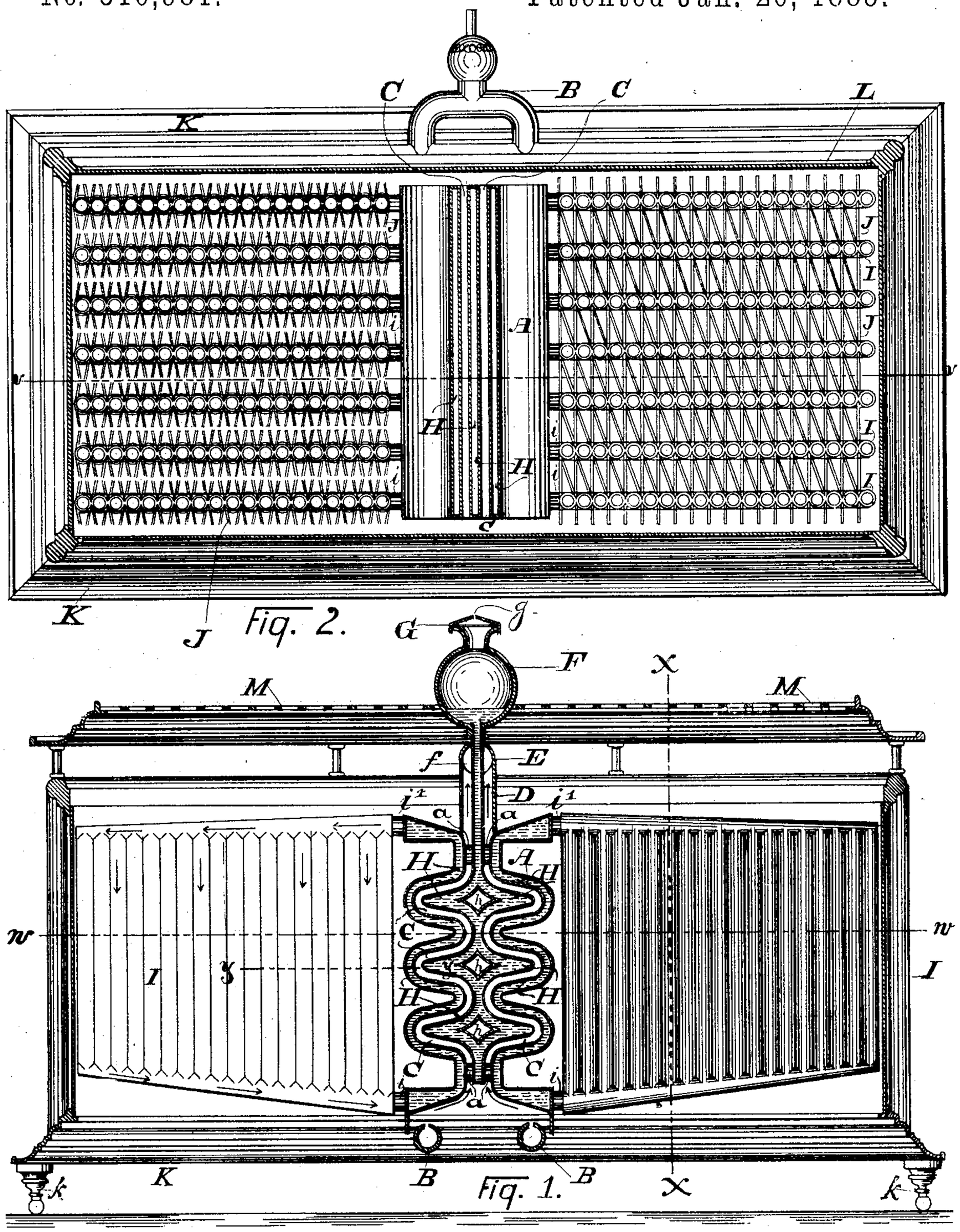
(No Model.) 2 Sheets—Sheet 1.

W. H. BROWN.

HOT WATER RADIATOR.

No. 310,981. Patented Jan. 20, 1885.



WITNESSES.

Jacob. W. Loeper

Chas. L. Thurber.

INVENTOR.

William H. Brown,

PER

C. Bradford.

ATTORNEY.

(No Model.) 2 Sheets—Sheet 2.

W. H. BROWN.

HOT WATER RADIATOR.

No. 310,981. Patented Jan. 20, 1885.

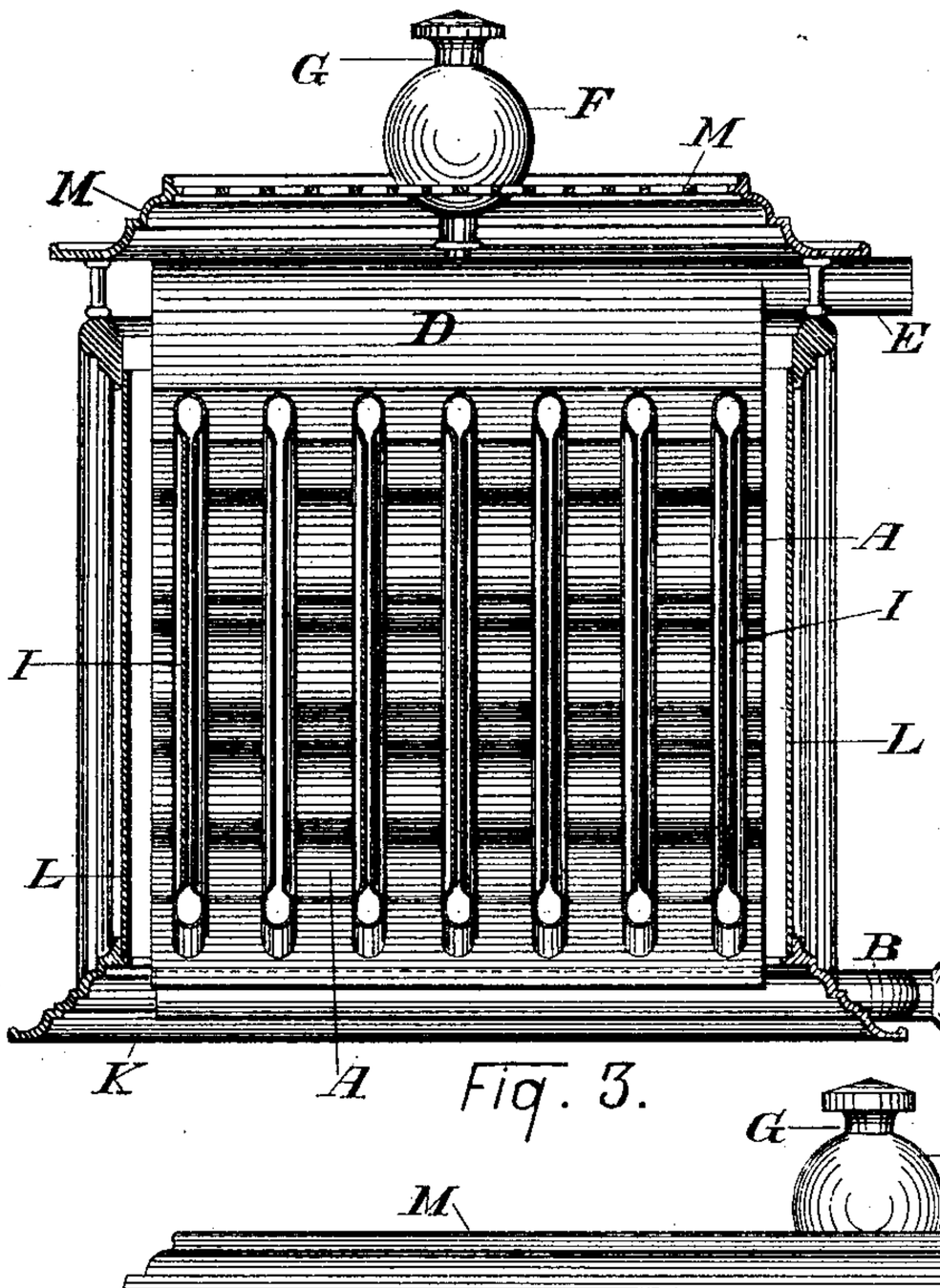


Fig. 3.

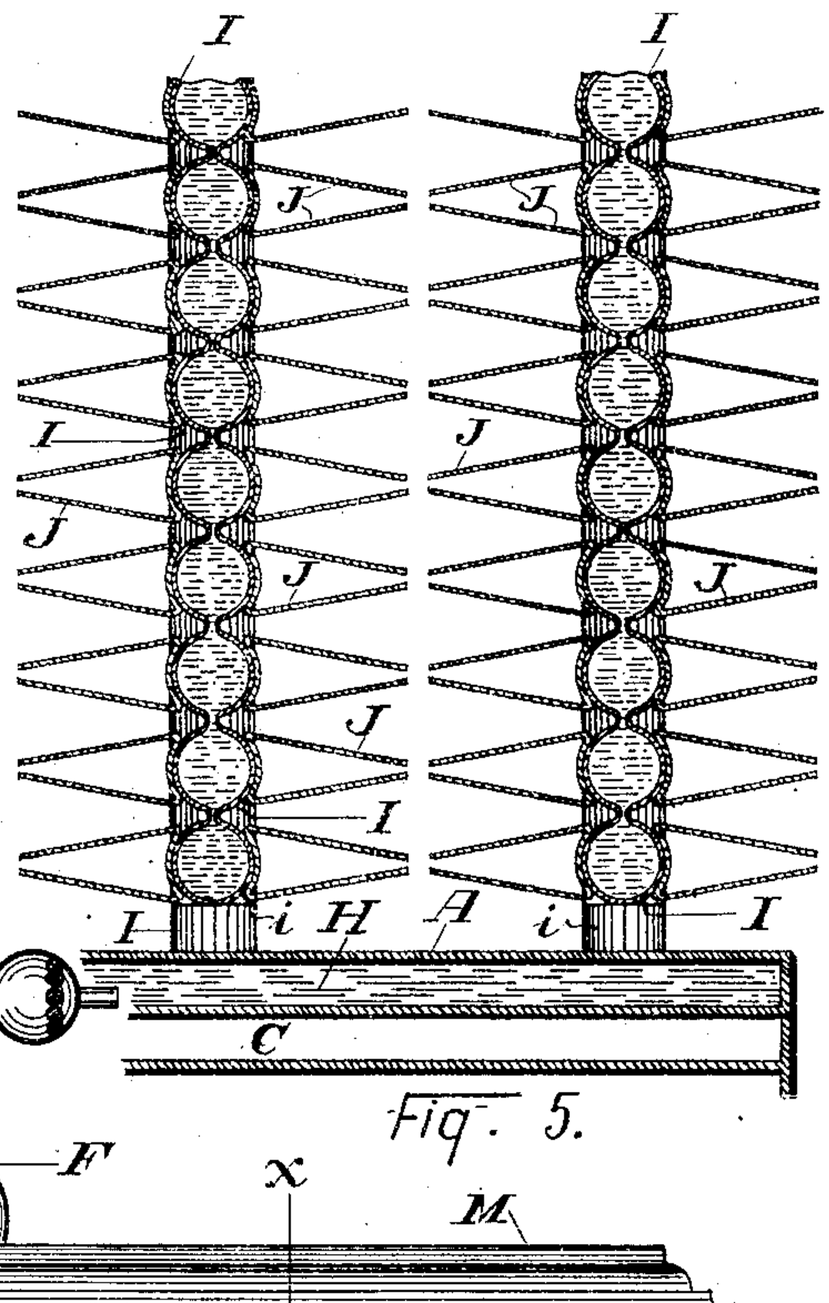


Fig. 5.

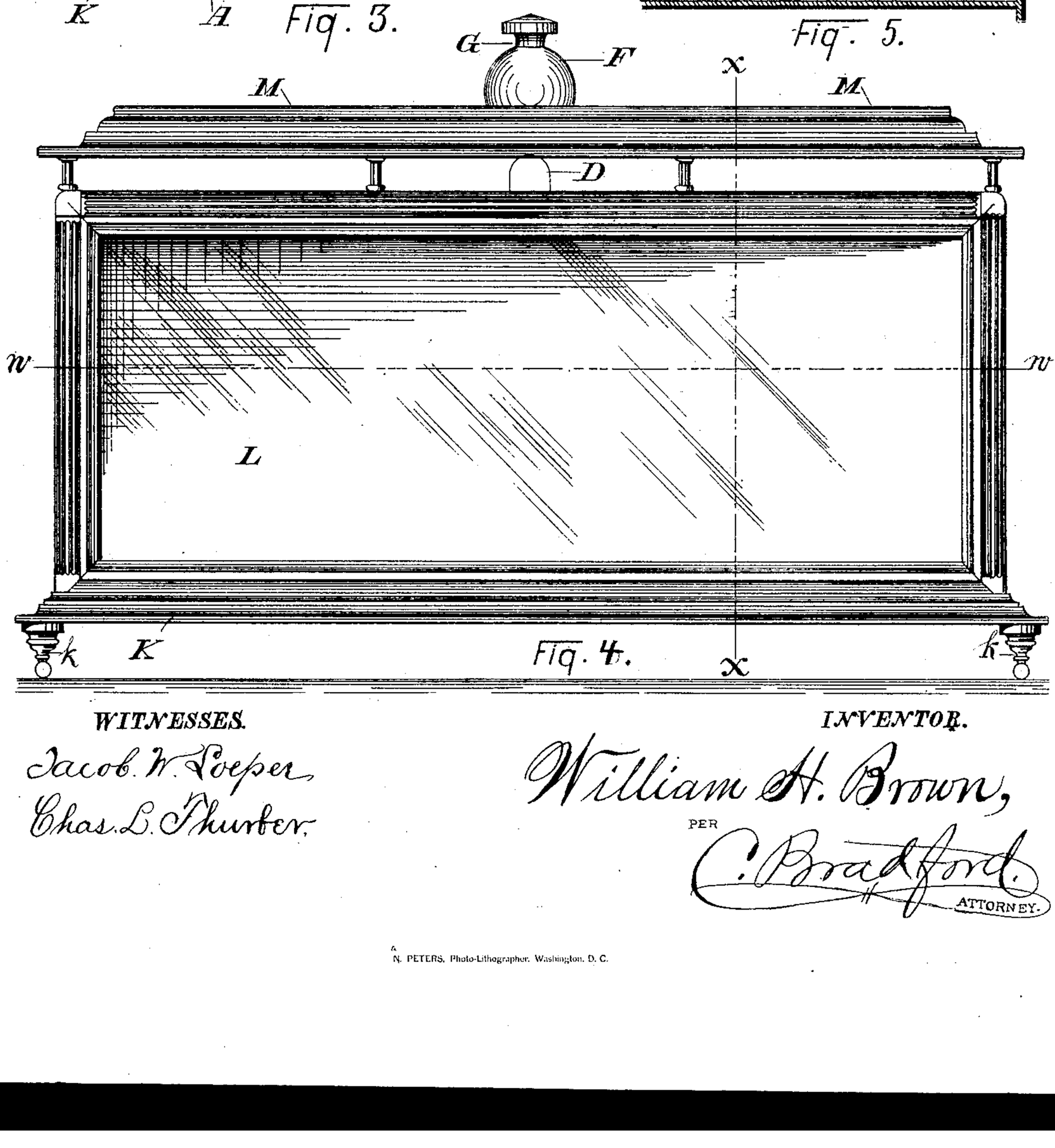


Fig. 4.

WITNESSES.

Jacob. W. Loeper,
Chas. L. Thurber.

INVENTOR.

William H. Brown,
PER
C. Bradford.
ATTORNEY.

UNITED STATES PATENT OFFICE.

WILLIAM H. BROWN, OF INDIANAPOLIS, INDIANA.

HOT-WATER RADIATOR.

SPECIFICATION forming part of Letters Patent No. 310,981, dated January 20, 1885.

Application filed January 31, 1882. (No model.)

To all whom it may concern:

Be it known that I, WILLIAM H. BROWN, of the city of Indianapolis, county of Marion, and State of Indiana, have invented certain new and useful Improvements in Hot-Water Heat-Radiating Stoves, of which the following is a specification.

The object of my said invention is to produce apparatus whereby water may be heated and the heat thus produced be radiated, preferably by the combustion of gas, in such manner as to replace ordinary solid-fuel-consuming stoves. This object is accomplished by providing a central reservoir or generator of such construction as to fully utilize the heat produced by the combustion of the gas consumed beneath it, as well as to provide a free and continuous circulation of water through all its parts; connecting to the two opposite sides of this central reservoir a series of hollow corrugated metallic heating-plates arranged vertically side by side at uniform distances apart, the interior of each having communication at the top and at the bottom with the interior of the central reservoir; attaching to the vertical sides of these heating-plates a series of metallic wings, which are so closely connected thereto as to be practically integral therewith; mounting a hollow glass globe or vessel on top the radiator, and connecting the same with central reservoir; surrounding the structure with a suitable inclosing-case, and providing, in connection with the central reservoir, a heating apparatus, which preferably consists of a series of gas-jets arranged to strike against the under side of said reservoir.

The object may be measurably accomplished by certain modifications or variations of the devices just mentioned, and I therefore do not wish to be understood as confining myself to such construction further than as hereinafter specified and claimed.

Referring to the accompanying drawings, which are made a part hereof, and on which similar letters of reference indicate similar parts, Figure 1 is a longitudinal vertical section on the dotted line *v v;* Fig. 2, a horizontal section looking downwardly from the dotted line *w w;* Fig. 3, a transverse vertical section, looking to the left from the dotted line *x x;* Fig. 4, a side elevation of the finished radiator; and Fig. 5, a detail sectional view, on an enlarged scale, of the heating-plates, wings, and a portion of the central reservoir, on the dotted line *y y*.

In said drawings, the portions marked A represent the central reservoir or generator; B, the gas-burner, which, in the example shown, is a perforated tube; C, a channel between the portions of the generator for the passage of the products of combustion; D, a chamber in which said channel terminates; E, a pipe leading from said chamber to the chimney; F, a preferably transparent vessel at the top, connected to the reservoir by the pipe *f;* G, a cap which, when removed, permits water to be introduced, and which is provided with a vent-hole, *g;* H, the water-cavity in the reservoir; *h*, tubes passing horizontally through the larger parts thereof; I, the corrugated heating-plates, the water-spaces between which are connected to the central reservoir by small pipes *i i';* J, the vanes attached to said plates; K, the bottom frame-work or base of the radiator; L, the preferably transparent side plates, and M the perforated top resting thereon.

The central reservoir, A, is constructed of sheet-metal corrugated plates. The corrugations extend lengthwise the reservoir, or horizontally across the whole device, and are so arranged that when the several plates are brought into proximity to each other narrow serpentine spaces will be formed between them, some of which are intended to be entirely inclosed and contain water, and others to form passages, through which the products of combustion pass on their way to the chimney. The several water-chambers of this reservoir are connected together at the top and bottom by the short pipes *a*.

The burner B is a gas-burner of any approved form for this purpose. The jets of flame therefrom first strike against the bottom plates of the central reservoir, A, then pass in the direction of the arrows up the serpentine passages between the several water-chambers of said reservoir into the chamber D, and finally through the pipe E to the chimney, and thus to the open air. On its passage through the serpentine ways C the flame is deflected against first one surface and then another until its heating-power is practically exhausted, or, in other words, until its heat is nearly all absorbed by the plates constituting the

sides of the reservoir, and by them transferred to the water inside.

The passages C are, as has been already described, serpentine ways, formed by the corrugations in the plates forming the sides of the water-cavities in the central reservoir, for the passage of the products of combustion from the gas-burners to the chamber D.

The chamber D is simply an enlarged termination of the ways C, to allow the products of combustion to all enter the pipe E in unison.

The globe or other vessel, F, is preferably of glass or other transparent material, so that its contents may be seen from the outside, and so that information as to the amount of water in the reservoir may be conveniently obtained, and the proper time to introduce more water therein thus determined. It has a funnel-shaped inlet, through which the water is introduced, which is preferably provided with a screw-cap, G, having an air-hole or vent, *g*. In filling the reservoir water is poured in until it appears in the bottom of this globe, as shown in Fig. 1. The space left empty serves to accommodate the temporary expansion of the water during the process of heating before any of it has evaporated or become otherwise wasted.

The water-spaces H, like the passages C, consist of interstices between the sheet-metal plates composing the central reservoir, or between said plates and the pipes *h*. As will be seen from the drawings, especially Fig. 1, the whole construction of the reservoir is such as to give the water a serpentine course in passage through these water-spaces, bringing it successively in contact with several heating-surfaces.

The heating-plates I are formed of sheet metal, and have a series of corrugations formed therein, one of which extends about horizontally along the top edge of the plate, and one about horizontally along the bottom edge thereof, these being connected together by a series of vertical corrugations arranged side by side along the entire length of said plate. These plates thus formed constitute a hollow plate, which, internally considered, consists of two substantially horizontal tubes, one at the top and one at the bottom, and a series of vertical tubes connecting them. Each of these double or hollow heating-plates has two connections to the central reservoir—one, *i*, at the bottom, through which the water flows from said plates into the reservoir when the apparatus is in operation, and the other, *i'*, at the top, through which the water flows back into the hollow plates—it being understood that the action of the heat will drive the water continually into the plates from the top of the reservoir, necessarily causing it to flow back again into the reservoir at the bottom. The wings J are also of sheet metal, and are preferably triangular in horizontal cross-section, the base of the triangle being curved to fit the convex side of the vertical corrugations of the heating-plates, and the apex of the triangle being slightly open. This construction may of course be varied to a considerable extent, two forms being illustrated in Fig. 2.

The entire radiator should be secured within an inclosing-case consisting of the base K, having the ordinary feet, *k*, preferably transparent sides L, and perforated top M. The air is thus caused to pass from below up through the radiator, coming in contact with the several heating-plates and wings, and thereby becoming heated, and pass out into the room through the perforations in the top. The sides L being of glass makes the inclosing-case much less expensive and much more easily kept clean than a case having metal sides would be. They also, by reason of their capacity to receive elaborate decoration in an inexpensive manner, render possible the production of a much more highly ornamental heating apparatus than has heretofore been possible within the usual limit of cost.

The operation of the apparatus is as follows: The screw-cap G is removed and water is introduced into the radiator, which is filled until the water becomes visible in the glass globe at the top. The screw-cap is then replaced, and the burners at the base being lighted, the flames thereof impinge against the inclined surface of the bottom of the central generator, from which they are deflected right and left toward the narrow flame-passages C, into which they enter and pass upwardly through the same, following the undulations thereof, and finally discharge at the top into the chamber D, from which they escape by the pipe E into the chimney. When the flames begin to act upon the inclined surface of the bottom of the generator, the contained water in the generator, becoming slightly warmed at that point, begins to rise in the water-chamber, being continually exposed during its passage to the top of the generator to the action of the heat in the flame-passages, and finally flows out laterally into the heating-plates through the passages *i'*, where it flows horizontally through the upper horizontal tube of the said plates, and from which it descends through the vertical tubes into the horizontal tube at the bottom of the heating-plates, along which it flows laterally toward and into the bottom of the generator through the passage *i*, when it is again exposed to the action of the heat in the flame-passages. While this process is going on, increasing in rapidity as the heat increases, the colder water contained in the heating-plates is being driven into the bottom of the generator, where it is in turn exposed to the action of the heat, and this process thus continuously maintained will finally cause all the water contained in the apparatus to become highly heated. As the temperature of the contained water rises its heat is communicated to the vertical sides of the heating-plates, which in turn communicate their heat to the projecting metallic wings attached to the sides thereof, and these, by giving up their heat to the air contained between them and with

which they are in contact, will cause this air to rise and pass through the perforated top of the apparatus into the air of the apartment in which the apparatus is located, and this displacement of the air will cause the colder air in the lower part of room to be drawn in at the bottom of the radiator and pass up between the heating-plates, being finely divided in its passage by the metallic wings, and being heated in its passage, it also is discharged into the air of the apartment, and this process thus continuously maintained will finally cause all the air in the apartment to become warmed to the desired temperature. The flow of gas being regulated by a key, in the usual manner, enables the user to control the temperature of the water in the radiator, and consequently the temperature of the air in the apartment, at will.

By the use of my apparatus the labor, annoyance, and uncleanliness attendant upon the use of the usual heavy and bulky solid fuels are avoided, and the advantages of steam-heat are attained without the costly fitting up and expensive service usually required, thus adapting it to use in small residences, private rooms, and offices.

Having thus fully described my said invention, what I claim as new, and desire to secure by Letters Patent, is--

1. The combination, in a hot-water radiator-stove, of a central reservoir to which the heat is applied, provided with laterally-projecting corrugated plates, forming hollow chambers, into which the heated water may flow from said reservoir by means of conduits connecting said chambers to said reservoir at or near the top, and from which the cooler water will flow into said reservoir by means of conduits connecting said plates and said reservoir at or near the bottom, the circulation being maintained by the action of the heat, substantially as set forth.

2. The combination of the central heating-reservoir, A, having water-cavities H and flame-passages C, lateral wings or plates I, corrugated to form hollow chambers or water-receptacles, and connections between said reservoir and said chambers, substantially as set forth.

3. The combination, in a radiator-stove, of the central heating-reservoir and laterally-attached corrugated plates, said plates forming, when brought together as shown, hollow water-receptacles, consisting, essentially, of two substantially horizontal tubes connected together by substantially vertical tubes.

4. The combination of the reservoir A, having flame-channels C and water-spaces H, with burner B, the wings I, and the inclosing-case, substantially as set forth.

5. In a heating apparatus, a reservoir or generator, A, constructed of corrugated plates, as shown, which form serpentine passages C for the products of combustion between similarly-formed water-cavities H, substantially as set forth.

In witness whereof I have hereunto set my hand and seal, at Indianapolis, Indiana, this 24th day of January, A. D. 1882.

WILLIAM H. BROWN. [L. S.]

Witnesses:

C. BRADFORD,

CHAS. L. THURBER.